

## [54] COMPUTER CONTROLLED MULTI-LINK COMMUNICATION SYSTEM

[75] Inventors: James E. Dahlquist, Palatine; Peter C. Holtermann, Chicago; Carl P. Rau, Mount Prospect, all of Ill.

[73] Assignee: Rauland-Borg Corporation, Chicago, Ill.

[21] Appl. No.: 803,133

[22] Filed: Nov. 27, 1985

[51] Int. Cl.<sup>4</sup> ..... H04M 3/22; H04Q 1/30; H04Q 3/545; H04Q 3/64

[52] U.S. Cl. .... 379/247; 379/263; 379/265; 379/269; 379/384

[58] Field of Search ..... 379/157, 159, 160, 164, 379/165, 247, 284, 290, 217, 263, 265, 269, 383, 384; 370/96

## [56] References Cited

## U.S. PATENT DOCUMENTS

2,258,650	10/1941	Herrick	379/243
2,261,243	11/1941	Flint	379/262
2,883,472	4/1959	Stehlik	379/159
2,911,477	11/1959	Gohorel et al.	379/245
2,966,554	12/1960	Dubois	379/210
3,342,944	9/1967	Barbato et al.	379/158
3,350,508	10/1967	Swanson	379/252
3,501,596	3/1970	Bierman	379/208
3,551,601	12/1970	Sloan et al.	379/209
3,553,385	1/1971	Morgan et al.	379/207
3,584,151	6/1971	Kielar	340/825.48
3,660,610	5/1972	Hestad et al.	379/203
3,678,208	7/1972	Eddy	379/255
3,697,700	10/1972	Greason, III et al.	379/274
3,701,853	10/1972	Duval et al.	379/208
3,809,824	5/1974	Dahlquist et al.	379/48
4,064,377	12/1977	Regan	379/342
4,081,614	3/1978	Dahlquist et al.	379/49
4,180,860	12/1979	Driscoll et al.	364/900
4,289,934	9/1981	Pitroda et al.	379/269
4,351,986	9/1982	Fechalos	379/163
4,559,417	12/1985	Komuro et al.	379/157
4,570,035	2/1986	Pinede et al.	379/164
4,605,825	8/1986	Komuro et al.	379/165

## FOREIGN PATENT DOCUMENTS

1238103 7/1971 United Kingdom .

## OTHER PUBLICATIONS

"ROLMphone (Reg. Trademark) Digital Telephones," ROLM Corp., Santa Clara, California (1983) (12 pages).  
 "ROLMphone (Reg. Trademark) User's Guide," ROLM Corp., Santa Clara, California (1984).

Primary Examiner—Thomas W. Brown

Attorney, Agent, or Firm—Leydig, Voit &amp; Mayer

## [57] ABSTRACT

A multi-link communication system includes a number of stations and interconnecting audio links under the control of a central computer. Each station is addressable by the computer for connecting selected stations to a selected audio link for establishing audio communication between stations. Each station has at least one corresponding access circuit for establishing an audio connection to a selected or preassigned link, and the connection is maintained by a corresponding memory circuit that is addressable by the computer. A group of output lines from the computer are used as select inputs to an analog multiplexer connecting a bidirectional control line to the selected access circuit for connecting or disconnecting the corresponding station and also for receiving connect or disconnect requests from the corresponding station. In a particular embodiment, the stations include multi-link dial and dialless telephones, single-link dialless telephones, and intercom speakers in an automatic private branch exchange. Latching relays provide audio connections for speakers and dialless single-link phones, and unbalanced analog transmission gates provide audio connections for multi-link phones. The capabilities of each station are encoded as predefined attributes stored in electrically alterable memory, and the attributes of a selected station are user-programmable via the touch-tone dial of an administrative telephone. Standard and priority call-ins from dialless phones and intercom speakers are identified on numeric or graphic displays interconnected to the computer via a shielded wire or shielded balanced pair conveying a pulse-width modulated binary signal.

20 Claims, 25 Drawing Sheets

